



UNITED STATES PATENT AND TRADEMARK OFFICE


UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,281	01/11/2002	Gregory M. Chrysler	P 0276915 P12676	4565
27496	7590	01/29/2004	EXAMINER	
PILLSBURY WINTHROP LLP 725 S. FIGUEROA STREET SUITE 2800 LOS ANGELES, CA 90017			CIRIC, LJILJANA V	
			ART UNIT	PAPER NUMBER
			3753	

DATE MAILED: 01/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 10/042,281	Applicant(s) Chrysler et al.	
Examiner Ljiljana V. Ciric <i>LC</i>	Art Unit 3753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Aug 25, 2003 and Nov 12, 2003
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 6-14, 16-22, and 25-30 is/are pending in the application.
- 4a) Of the above, claim(s) 14 and 25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6-13, 16-22, and 26-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Jan 11, 2002 is/are a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

Art Unit: 3743

DETAILED ACTION

Election/Restriction

1. Applicant's election without traverse of the first species, or the embodiment of Figures 2A, 2B, and 2C in Paper No. 5 and Paper No. 8 is acknowledged.

Contrary to applicant's assertion that all of the remaining claims are readable on the elected species, the examiner hereby notes that, of remaining claims 1, 2, 6 through 14, 16 through 22, and 25 through 30, at least claims 14 and 25 are NOT drawn on the elected first species. First of all, claim 14 recites the heat-dissipating material as comprising "a material capable of changing phase", thus characterizing the non-elected thermosiphon embodiments of, for example, Figures 5A and 5B as described in paragraph [0029]. Second of all, claim 25 recites the conduit portions being "staggered relative to each other", thus characterizing the non-elected embodiments of Figures 4A and 4B as described in paragraph [0024].

2. Claims 14 and 25 are thus withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made without traverse in Paper No. 5 and Paper No. 8.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following features must be shown or the features canceled from the claims, for example: the conduit portion being at least partially

Art Unit: 3743

filled with a heat-dissipating material such as copper or silver having high conductivity as recited in the claims [note that the drawings only show conduit portions which appear to be voids or which have a fluid flowing therethrough]; a spreader external to the die as recited in claims 2, 20, or 21; a floating point mechanism in the die as recited in claim 10; the conduit portion formed in a back face of the die as recited in claim 13; a spreader which is a thermal spreader or a spreader which is an integrated heat spreader; and, the conduit portion having a tube therein as recited in claim 30. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: claim 10 recites “a floating point mechanism” in the die, whereas paragraph [0004] refers to “a floating point unit”. Consistency should be maintained throughout the application with regard to terminology.

Claim Rejections - 35 U.S.C. § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 3743

6. Claims 20 and 21 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The originally filed disclosure, including the originally filed drawings and the originally filed specification, fail to fully and clearly describe the construction and arrangement of any type of spreader associated with the instant invention, or even to identify the claimed spreader(s) as being of a type well-known in the art. Thus, it is not clear that applicant had, at the time of invention, possession of a spreader associated with the instant invention which spreader is "constructed and arranged to dissipate at least a portion of the heat" as recited in claim 20, for example.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1, 2, 6 through 13, 16 through 22, and 26 through 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "high" in each of claims 6, 7, and 17 is a relative term which renders the claims indefinite. The term "high" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. While the specification gives silver and copper as examples of suitable materials with appropriate conductivities, it is not clear whether, for

Art Unit: 3743

example, the conductivity of any metal would be similarly suitable and thus included within the scope of the claims. Thus, as used to qualify the conductivity of the heat-dissipating material, this term renders indeterminate the range of conductivities which qualify as “high” and those which do not, thus rendering the intended scope of protection sought by the claims indefinite.

The term “back” as used in each of claims 11 and 13 to qualify the face of the die on which the conduit portion is formed is similarly relative, thus rendering the claims indefinite. What constitutes the “back” of the die as opposed to the “front” of the die? The position of the die relative to the viewer? The position of the die relative to some other element? The term “back” is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

With regard to claim 12 as written, it is not clear whether the limitation “a semiconductor die having at least one conduit portion” in line 3 is used to mean that the semiconductor die includes at least one conduit portion or whether it merely has at least one conduit portion associated therewith, such as in a thermally adjoining element to the die.

It is not clear which particular structural configuration(s) correspond to, or are encompassed by, the limitation “the spreader constructed and arranged to dissipate at least a portion of the heat” as recited in claim 20, for example, thereby rendering indefinite claim 20.

The alternative limitations “wherein the spreader is a thermal spreader or an integrated spreader” as recited in claim 21 render the intended scope of protection sought by the claim

Art Unit: 3743

indefinite. For example, it is not clear whether the terms “thermal spreader” and “integrated spreader” are merely two equivalent terms for the same element or whether the two terms refer to two distinct configurations. If the two terms refer to the latter, then it is furthermore not clear which particular configurations correspond to the each.

It is not clear whether the indeterminate term “therein” appearing in each of at least claims 1 and 26 through 30 refers to the conduit portion or to the arrangement or to the semiconductor die, thus rendering the claims indefinite with regard to the scope of protection sought. Recommend replacing each occurrence of “therein” in the claims with a direct recitation of the element(s) referred to thereby.

The above is an indicative, but not necessarily an exhaustive, list of 35 U.S.C. 112, second paragraph, problems. Applicant is therefore advised to carefully review all of the claims for additional problems. Correction is required of all of the 35 U.S.C. 112, second paragraph problems, whether or not these were particularly pointed out above.

Claim Rejections - 35 U.S.C. § 101

9. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claim 11 is rejected under 35 U.S.C. 101 because it the claimed invention is directed to non-statutory subject matter. Claim 11 recites limitations relating to a method of manufacture, whereas base claim 1 from which claim 11 depends is drawn to a process of using a machine.

Art Unit: 3743

Thus, claim 11 appears to be drawn to two types of inventions instead of just to one as required by statute.

Claim Rejections - 35 U.S.C. § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

NOTE: The above reflects changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002.

12. As best can be understood in view of the indefiniteness of the claims, claims 1, 2, 6 through 8, 10 through 13, 16 through 18, 20 through 22, and 26 through 30 are rejected under 35 U.S.C. 102(e) as being anticipated by *Huemoeller* (filed February 16, 2000).

Huemoeller discloses a method and an arrangement for dissipating heat from a localized area within a semiconductor die assembly 10, including: a semiconductor die 102 having at least one conduit portion or cylindrical via or aperture 34 formed at one side of the die 102 (i.e., on the "back" side of the die); a heat dissipating material layer 36 such as copper [see column 4, lines

Art Unit: 3743

16-21] at least partially filling the at least one conduit portion or via or aperture 34; and, a thermal or heat spreader or central layer 12 which is external to the die 102 [see column 4, lines 36-41].

The reference thus reads on the claims.

Claim Rejections - 35 U.S.C. § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. As best can be understood in view of the indefiniteness of the claims, claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Huemoeller* (filed February 16, 2000).

As discussed in greater detail above, *Huemoeller* discloses a method and an arrangement for dissipating heat from a localized area within a semiconductor die assembly 10, including a semiconductor die 102 having at least one conduit portion or cylindrical via or aperture 34 formed at one side of the die 102 (i.e., on the “back” side of the die) with a heat dissipating material layer 36 such as copper [see column 4, lines 16-21] at least partially filling the at least one conduit portion or via or aperture 34. While *Huemoeller* does not specify silver per se as being a suitable metal for partially filling the at least one conduit portion or via or aperture 34, Official Notice is taken hereby that, based on the physical properties of silver as compared to those of copper, it is

Art Unit: 3743

well-known in the art to substitute silver for copper in applications where even higher electrical or thermal conductivity is desired. Copper and silver have similar mechanical properties and are both highly conductive, but silver is even more highly conductive than copper.

Thus, it would have been obvious to one skilled in the art at the time of invention to modify the heat dissipation arrangement and method of *Huemoeller* by substituting silver for copper as the filler material for the at least one conduit portions 34 in order to increase the rate of thermal transfer out from the semiconductor die 102 via the heat spreader or central layer 12

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. *Matthews, Tanzer et al., Conte, Seshan et al., Norley et al., and Tamba et al. (both references)* all disclose semiconductor cooling assemblies and/or methods including material-filled vias or holes.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ljiljana (Lil) V. Ciric, whose telephone number is (703) 308-3925.

While she works a flexible schedule that varies from day to day and from week to week, Examiner Ciric may generally be reached at the Office during the work week between the hours of 10 a.m. and 6 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Scherbel, can be reached on (703) 308-1272.

The NEW central official fax phone number is (703) 872-9306.

Application/Control Number: 10/042,281

Page 10

Art Unit: 3743

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

lvc

January 23, 2004



LJILJANA V. CIRIC
PRIMARY EXAMINER
ART UNIT 3753